

REMARKS

1. Declaration

The Office Action objects to the Declaration as failing to identify the state of residence, mailing address, and citizenship of each inventor. Applicants note that the state of residence and mailing address were provided on an Application Data Sheet that accompanied the Declaration. A copy of the filed Application Data Sheet is attached as Exhibit 1. A Supplemental Declaration setting forth the citizenship of each inventor will be submitted when executed.

2. Specification

The typographical error noted by the Office Action in the paragraph at p. 11, ll. 27 – 33 has been corrected.

3. Drawings

Replacement sheets have been provided to correct the drawing errors noted in the Office Action. In particular, Fig. 1A has been amended to remove reference sign 119 and Fig. 1D has been amended to change reference sign 14 to 149.

4. Restriction

The Office Action requires restriction to one of two groups:

- I. Claims 1 – 11, 18 – 20, 22 – 39, 41 – 45, 49, and 50; and
- II. Claims 12 – 17, 21, 40, 46 – 48, 51, and 52.

Applicants affirm the provisional election of Group I without traverse. Accordingly, the claims of Group II have been canceled without prejudice.

The Office Action also requires election of one of thirteen identified species. Applicants affirm the election of Species 1 with traverse. Each of Claims 1 – 11 and 23 – 30 read on elected Species 1. In this respect, Applicants believe the withdrawal of Claims 23 – 30 is improper. Species 1 is identified in the Office Action as corresponding to Fig. 1A, and Applicants note that further description of the plasma generator plate shown in Fig. 1A is provided in connection with Figs. 1B – 1D. The plasma generator and substrate processing systems that are claimed in Claims 23 – 30 are realized in an embodiment by the structure shown in Fig. 1A and elaborated on in connection with Figs. 1B – 1D.

Applicants further note the following sets of Species on which each of Claims 1 – 11 and 23 – 30 read:

Claims 1 – 11: Species 1;  
Claim 23: Species 1, 2, 6, 8, and 9;  
Claim 24: Species 1, 2, 4, 6, 8, and 9;  
Claim 25: Species 1, 2, 6, and 8;  
Claim 26: Species 1, 2, 4, 6, and 8; and  
Claims 27 – 30: Species 1, 2, 8, and 9.

In connection with Species 2, Applicants note that the specification explicitly remarks on the fact that the plasma generating plate shown in Fig. 1A and discussed further in connection with Figs. 1B – 1D may be used in the processing chamber shown in either Fig. 1A or Fig. 2A (corresponding to Species 2) (Application, p. 13, ll. 14 – 16).

In view of the relationship between the claims and identified species, at least Claims 23 – 30 should be rejoined. In addition, since many of the claims that read on Species 1 are generic to multiple species, other claims that read on Species 1, 2, 4, 6, 8, and 9 should also be rejoined. In this respect, Applicants note the following Claims that read on each of these Species:

Species 1: Claims 1 – 11 and 23 – 30;  
Species 2: Claims 18 – 20 and 23 – 30;  
Species 4: Claims 24 and 26;  
Species 6: Claims 23 – 26;  
Species 8: Claims 23 – 30; and  
Species 9: Claims 23, 24, and 27 – 31.

Thus, the entire set of Claims 18 – 20 and 23 – 31 should be rejoined with Claims 1 – 11.

## 5. Claim Rejections

Claims 1 – 11 have been examined. Claim 10 stands rejected under 35 U.S.C. §102(e) as anticipated by U.S. Pat. No. 6,432,260 (“Mahoney”); Claims 1, 3 – 8, 10, and 11 stand rejected under 35 U.S.C. §102(e) as anticipated by U.S. Pat. No. 6,392,351 (“Shun’ko”); and Claims 2 and 9 stand rejected under 35 U.S.C. §103(a) as unpatentable over Shun’ko in view of U.S. Pat. No. 6,486,431 (“Smith”).

### a. Rejection Over Mahoney

Claim 10 has been amended to recite a third conduit comprised by the plasma generator plate passing from the first side to the second side, and not passing through a transformer core. The combination of limitations in amended Claim 10 is neither taught nor suggested by Mahoney. In particular, Mahoney discloses a plasma generator chamber that the Office Action would like to correspond to the plasma generator plate claimed. Fig. 2 of Mahoney shows that this plasma generator chamber has two hollow vacuum chambers, with ends of the vacuum chambers opening into a vacuum process region (Mahoney, Col. 7, ll. 54 – 59).

Even with the correspondence indicated in the Office Action, there is no disclosure in Mahoney of a conduit passing through a transformer core within the plasma generator plate as Claim 10 requires. The transformer cores (9a and 9b) shown in Fig. 2 of Mahoney are *outside* the plasma generator chamber, as shown with the cross-sectional view of those cores surrounding the exterior of the hollow vacuum chambers:

An air core or ferrite transformer core is wrapped *about* the vacuum chamber so as to impart electromagnetic energy to the vacuum chamber body.  
(Mahoney, Col. 6, ll. 26 – 29, emphasis added).

That the cores are not “within” the plasma generator chamber may be more evident from the perspective drawings shown for somewhat different embodiments in Figs. 6a and 6b of Mahoney.

Furthermore, Mahoney does not disclose a third conduit passing from the first side to the second side of the plasma generator plate, not passing through a transformer core, as amended Claim 10 requires.

b. Rejections Over Shun'ko

Claim 2 has been canceled and its limitation incorporated into independent Claim 1. This amendment has been made in a fashion that clarifies that the second of the conduits not passing through a transformer core corresponds to one of the plurality of through holes in the transformer-coupled plasma generator plate. The language of Claim 9 also requires that the second portion of the conduits not passing through centers of transformer cores correspond to a portion of the plurality of through holes in the transformer-coupled plasma generator plate. Minor amendments to Claims 4 and 5 have also been made to maintain consistency with amended Claim 1, from which they depend.

Fig. 6a of Shun'ko shows a plate 109 within a chamber having ferrite cores 114a and 116a built into the material of the plate (Shun'ko, Col. 5, ll. 16 – 23). The Office Action concedes that there is no disclosure in Shun'ko of a second conduit not passing through a transformer core and relies on Smith for such disclosure. Smith is directed to a toroidal low-field reactive gas source and the Office Action points to its disclosure of a single magnetic core arranged around one of a pair of split lines, where another split line is used as a return path. There is, however, nothing in Smith to suggest that the return split line be a through hole of a transformer-coupled plasma generator plate, as the amendments and remarks above make clear is required by both independent Claims 1 and 9. There is, accordingly, no teaching in Smith by which Shun'ko would be modified to include the conduit not passing through a transformer core as now claimed.

Expressed differently, the Office Action specifically suggests that "it would have been obvious to one of ordinary skill in the art ... to implement the split line mechanism as taught by Smith in the apparatus of Shun'ko as an art recognized alternative method of returning current through a conduit not containing a second core" (Office Action, p. 8). Even accepting this rationale *arguendo*, the combination still does not disclose the claim limitations that such a second conduit be a through hole in a transformer-coupled plasma generator plate. The combination suggested in the Office Action would instead result in a processing chamber having

the plate shown in Fig. 6a of Shun'ko with a split-line return path *separate* from the plate as taught by Smith. There is nothing in Smith or Shun'ko to suggest using through holes in the plasma generator plate as conduits that do not pass through a transformer core. Without such a teaching, no *prima facie* case under §103 has been established.

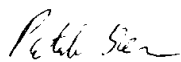
In this respect, Applicants note that the cited portion of Smith is nothing more than what Applicants specifically noted as existing in the prior art and giving rise to process-uniformity problems as a result of recombination effects (*see* Application, p. 2, l. 34 – Col. 3, l. 14). It was Applicants' recognition that permitting plasma return paths to flow in through holes in a plasma generator plate could significantly improve this process uniformity (*see* Application, p. 3, l. 31 – p. 4, l. 1). Neither Shun'ko nor Smith recognizes or suggests such a solution to this problem.

#### CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,

  
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